

Be sure to read the manual before using the system

- This manual is the user manual of double pendulum high power industrial welding system
- Read the manual carefully first to ensure the correct electrical connection

BWT40E

Qilin biaxis swing welding system user manual

E40 control box + BWT 40E, welding head



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Version update record

S 3.0	The display screen increases the ability to control the guide signal and blocks the guide signal under the closed state
S 3.1	Optimize the compatibility of different display models

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security information

When using the system, please ensure that the operation is correct and safe. Some signs or words will be used to remind you of dangerous matters and some important information.



danger:

Represents a serious danger. In the process of use, if the operation is improper or the use method is wrong, it may lead to serious injury or even death, please users and related personnel do not operate easily, until to ensure that the operation method and the correct way of use.



warn:

Indicates that a danger exists. In the process of use, if the operation is improper or the use method is wrong, which may cause injury to the personnel, please do not operate easily, until you ensure that the operation method is correct and the use method is correct.



prudent:

Represents a product potential risk. During use, if the use method is wrong or improper operation, the product or some parts may be damaged. Please users and related personnel do not operate easily until the operation method is correct and the use method is correct.

**important:**

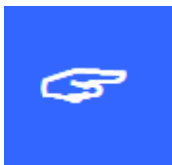
Represents an important information to note during the product. Please do not ignore this information, which provides effective operational help.



This label indicates laser radiation, which will generally be affixed to the output laser products. Please, be careful of laser and safety when using such equipment.

Receiving goods, unpacking and inspection

The product uses shock-proof soft packaging. If the package has any external damage marks, please check the damage to the equipment and notify the carrier and the carrier of the damage in written documents.



important:

After receiving the product, please check whether the outer package is in good condition, the product and parts after unpacking. If any damage is found, please contact the Qilin Laser immediately.

Remove all the goods from the packaging, and keep the packaging materials and wiring spare parts. When dismantling the package and removing the goods,

Please be careful of the goods for safety. After removing the goods, please check if the parts are complete and intact. If any missing parts or parts are damaged, please contact Qilin Laser immediately. If any obvious damage to the equipment, do not install or debug the equipment.

BWT 40E The delivery list of Qilin double pendulum high power industrial welding head system is shown in the following table: (As the product will be updated and upgraded, the delivery list may also be adjusted along with it)

	component	quantity	explain
1	BWT 40E, Welding head	1	
2	E40 control box	1	
3	7-inch LCD screen (HMI)	1	
4	7-inch display cable (DB9 head)	1	
5	Plus or minus 15V power supply	1	

6	Plus or minus 15V power cord	1	
7	24V power cord	1	
8	Urgent stop trigger line	1	
9	One point and two DC lines	1	
10	Video line	1	
11	Power extension line	1	
12	Blu-ray light transfer wiring	1	
13	Welding head connecting wire, DB15	1	
14	Blu-ray adjustable focus for 12V	1	
15	The DC12V power supply	1	
16	Blowing components	1	
17	Spare protective lenses	5	
18	caution light	1	
19	monitor	1	
20	laser goggles	1	

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深圳市麒麟激光应用科技有限公司

Chapter 1 summary

**The main contents
of this section are:**

- Qilin biaxis swing welding
- system introduction
- Product installation size
drawing

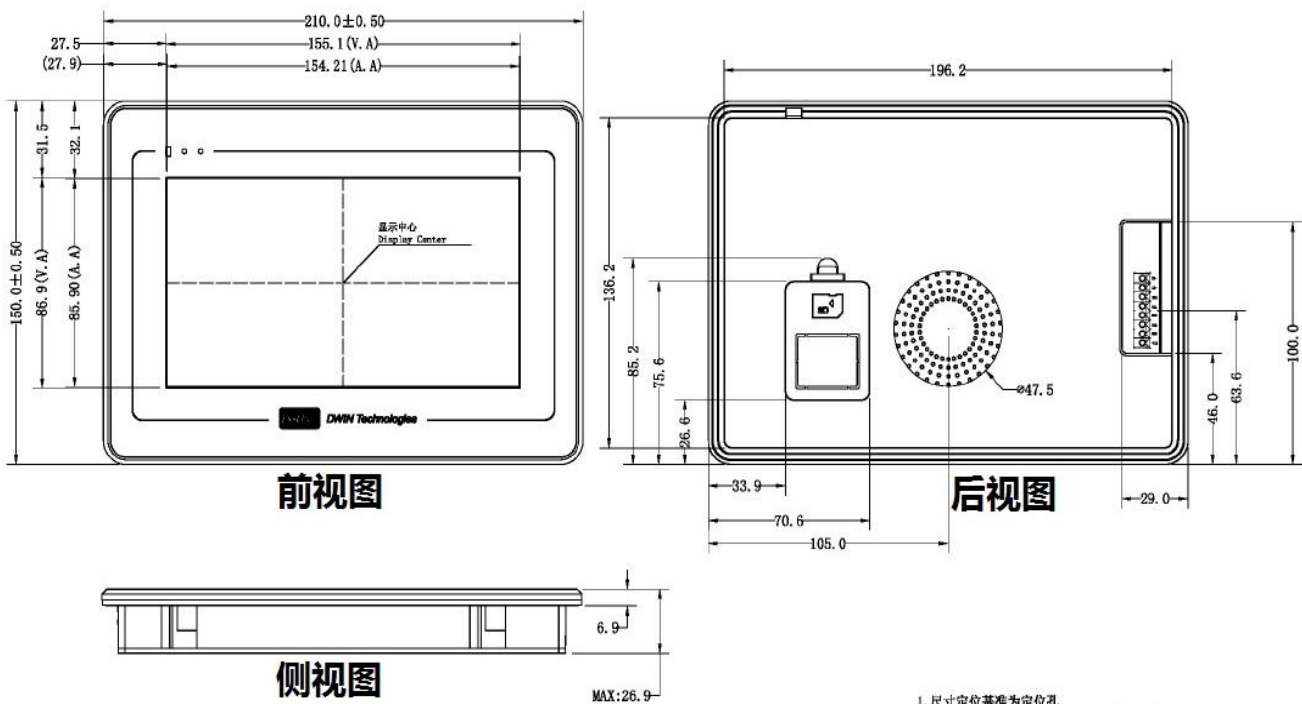
1.1 Qilin biaxis swing welding system introduction

Qilin double pendulum laser welding system is a control system for fiber laser welding developed by Qilin laser. Double vibration lens motor control, there are three swing modes: ring, rectangle, filling. Research and development of new light spot mode, to meet the multiple welding effect, to solve the industry problems, to provide more effective solutions for the vast market.

1.2 Product installation size drawing

1.2.1 Touch-screen installation dimensions

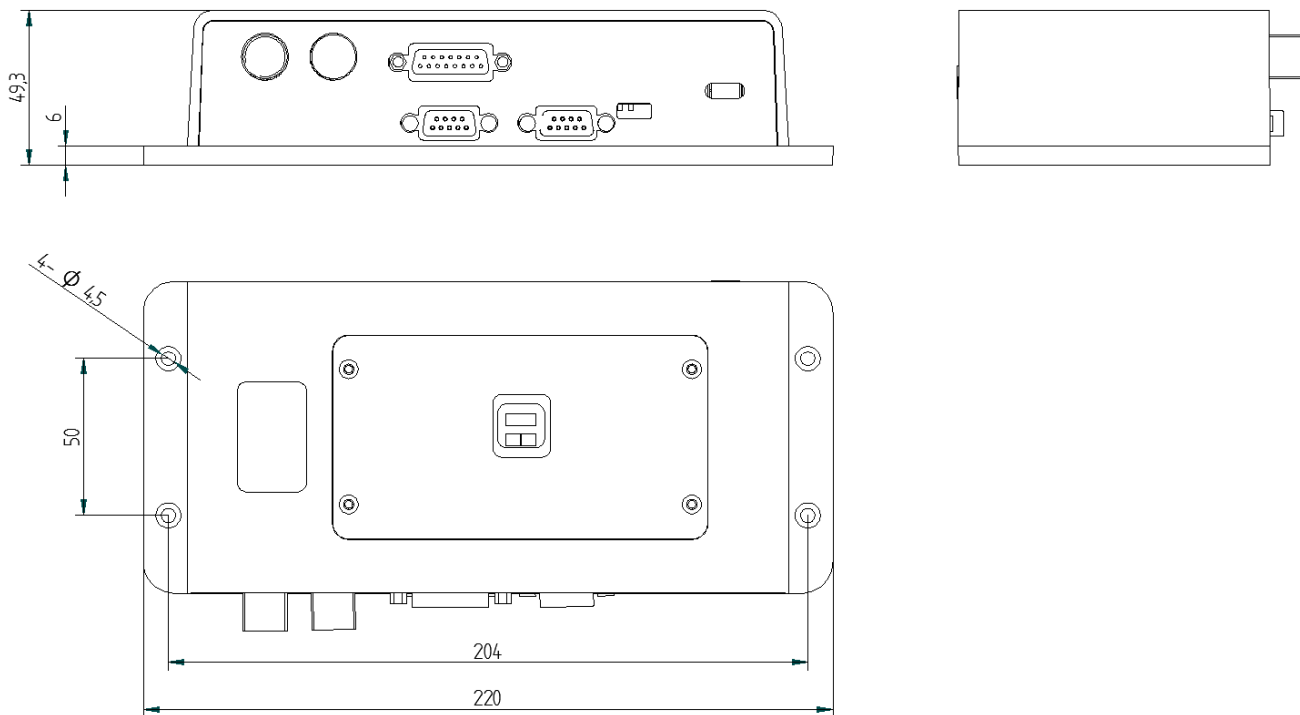
The installation dimensions of the touch screen are shown below:



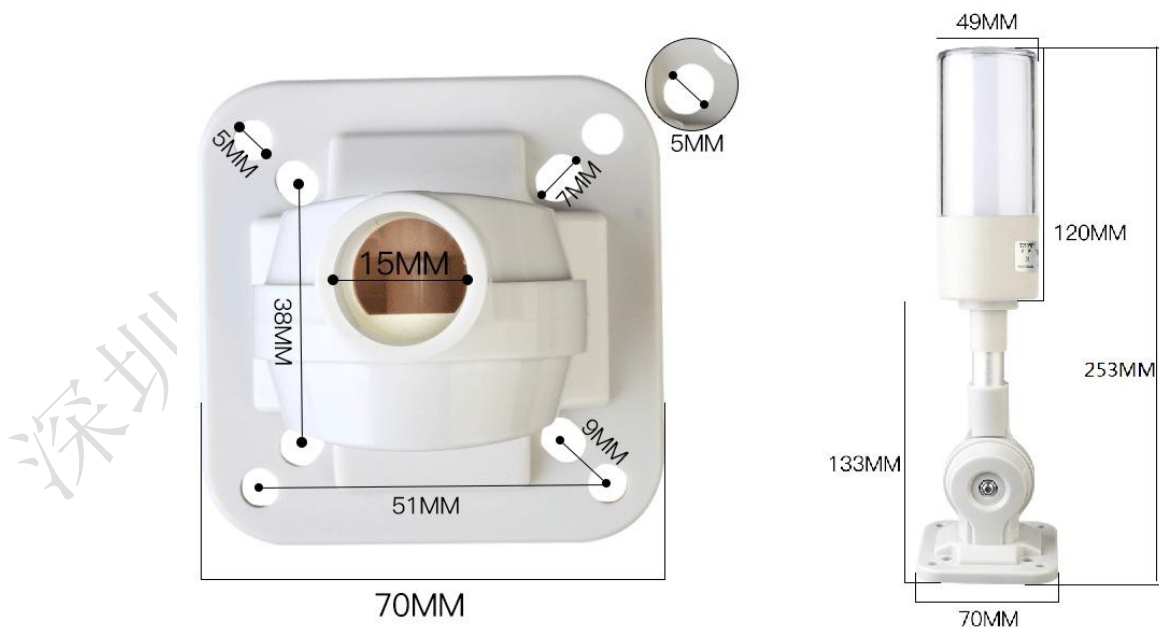
1. 尺寸定位基准为定位孔
Location hole is used as position reference.
2. 未标注公差为 $\pm 0.3\text{mm}$
Unmarked Tolerance is $\pm 0.3\text{mm}$
注: 虚线标注为有效显示区域
Active area is marked in Dash lines

1.2.2 Control box / alarm light, mounting dimensions

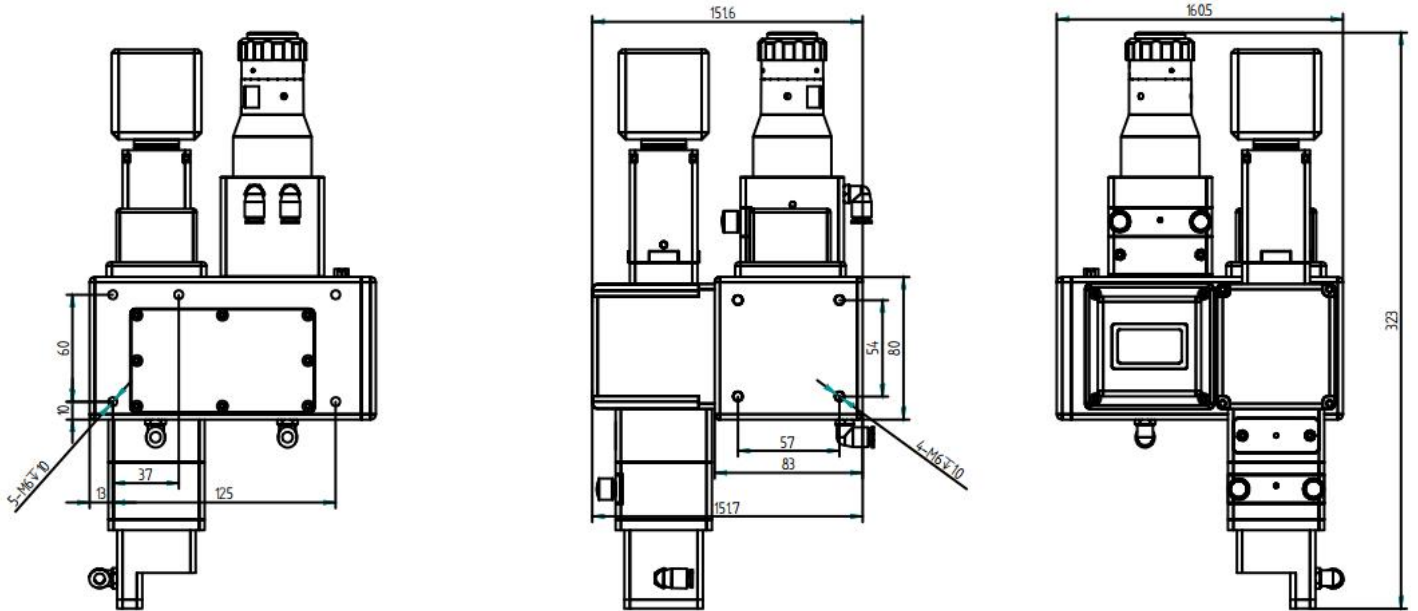
The installation size of the control box is shown in the following figure



The installation size is shown in the following figure



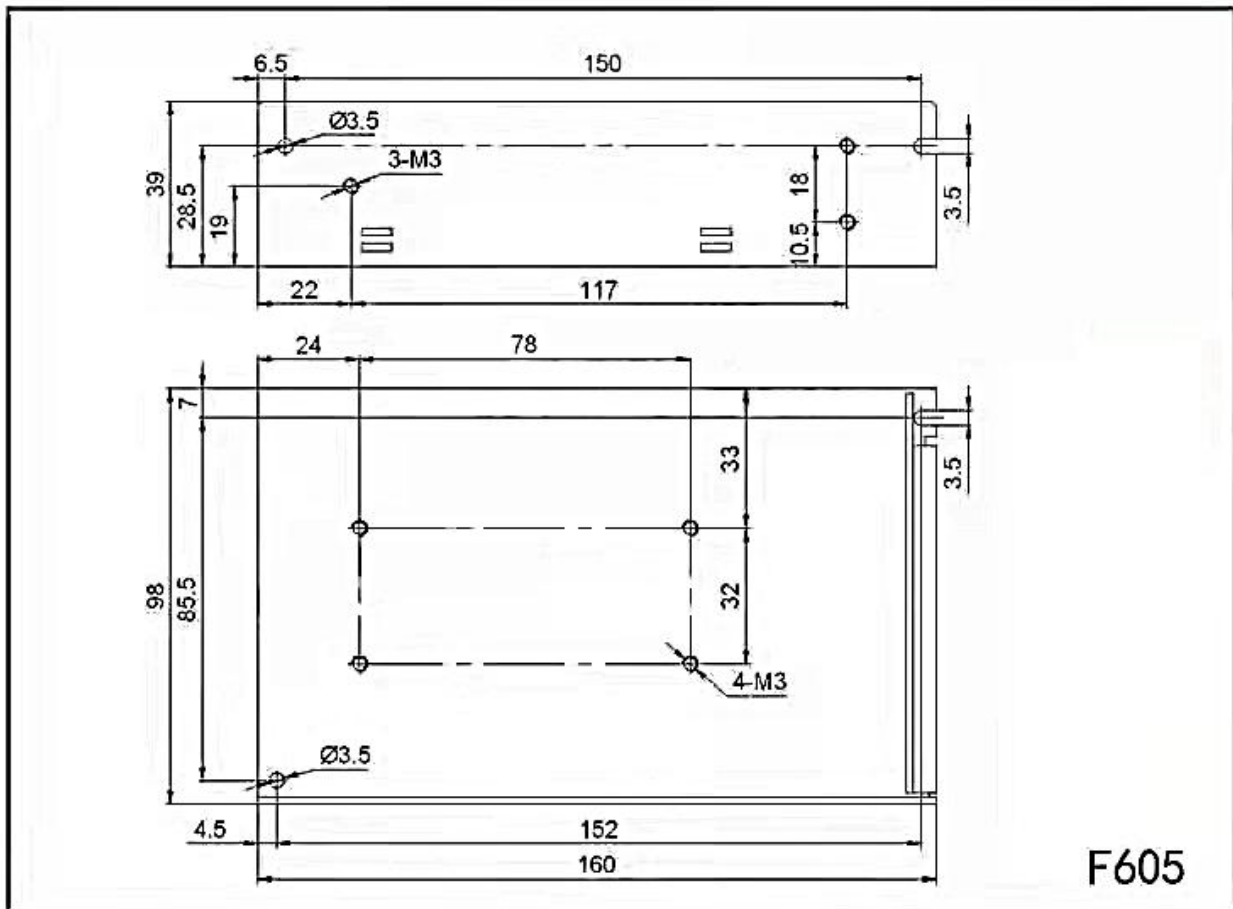
The welding torch head installation size is as shown in the figure below



1.2.3 Installation dimensions of the 15 V switching power supply

The installation size of the 15V switching power supply is shown in the following figure

安装尺寸图



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Chapter 2 System wiring

The main contents of this section are:

- Control box wiring
- Double pendulum high efficiency industrial welding head structure
- Power Interface
- HMI interface HMI interface
- Laser-decoding interface
- Double pendulum industrial welding head interface
- Urgent stop trigger line

- **Fan interface introduction**
- **Control interface of the wire feeder**
- **Laser device control interface**
- **Gas control, air pressure detection interface**
- **Alarm signal interface**
- **Robot control signal interface**
- **PNP & NPN conversion board**
- **Alarm lamp interface**
- **Dial switch**

2.1 Wiring of the control box

The following figure shows the wiring diagram of the whole system. The system wiring can refer to the schematic diagram and refer to the relevant chapter for detailed interface definition.

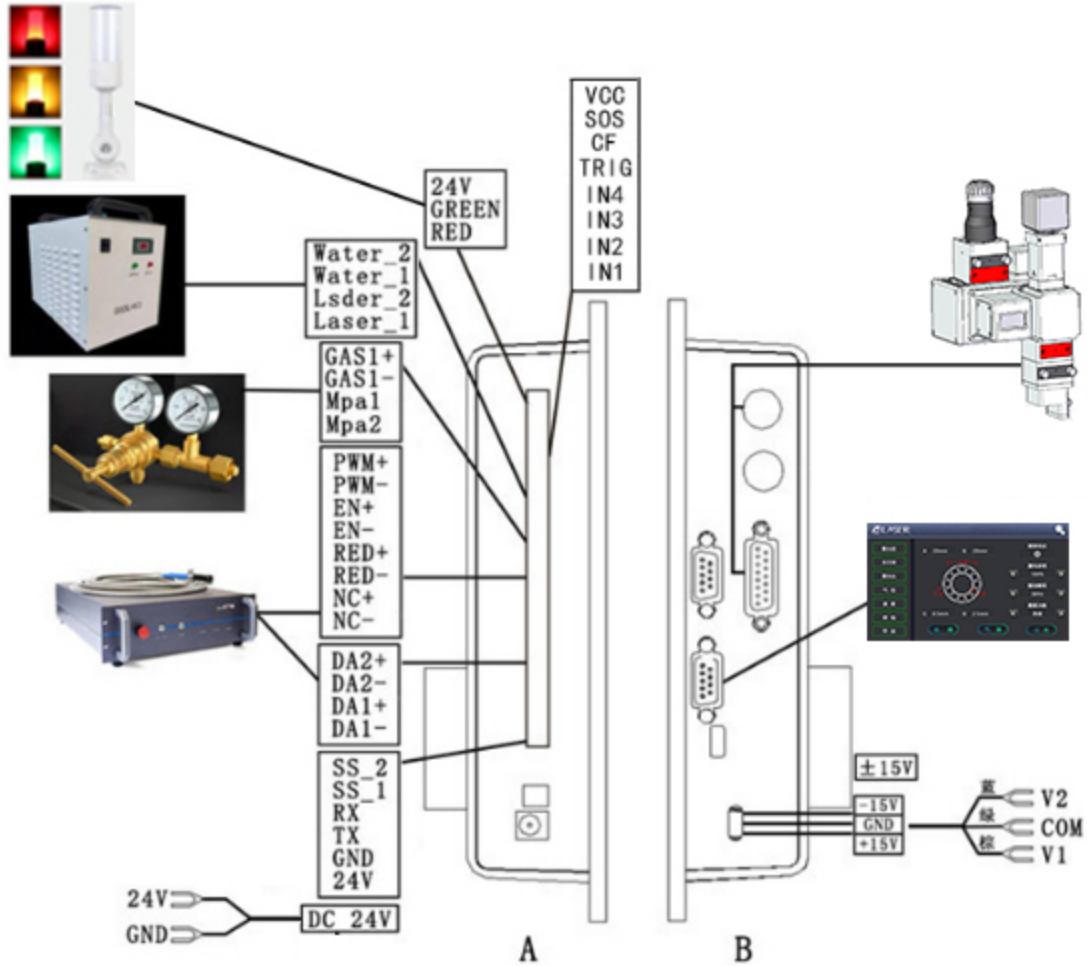


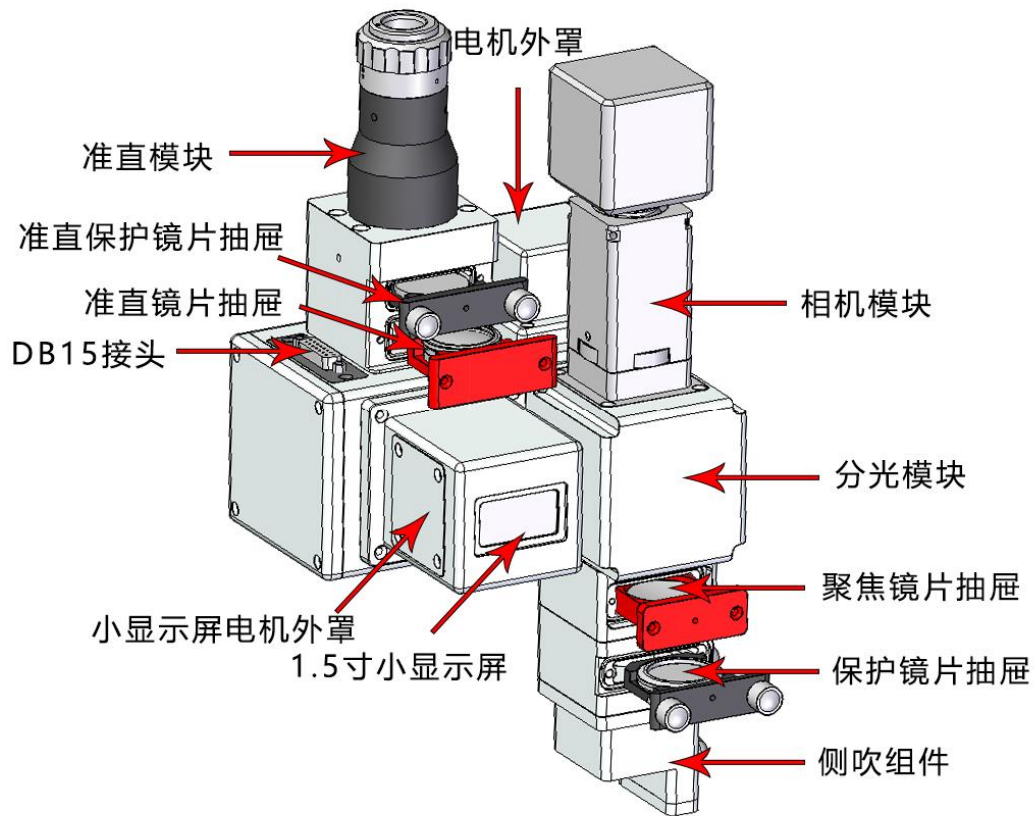
Figure 2.1 Schematic diagram of the system wiring



important:

Do not connect any instructions in the control box to other lines.

2.2 Double-axis swing welding head structure



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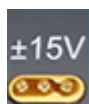
Figure 2.2 Structural diagram of double shaft swing welding head

parameter	scope
interface type	QBH
laser power	4000W
Collar focal length	100
Focus focal length	300
Regulate the spot	Ring, rectangle, and fill
hunting range	1-31mm
cooling-down method	hydrocooling
Applicable wavelength	1064-1080nm
Collimine lens	D37F 75
Focus on the lens	D37F 300
Reflective mirror	32×46T3
Protection mirror specifications	D37T5
Maximum air pressure support	0.6Mpa
Focus of vertical adjustment range	±15mm
TBM	4.8KG

2.3 Power interface



Figure 2.31 Power, interface diagram



+ 15V interface is the interface to provides power for the motor drive inside the control box, the voltage is positive or minus 15V (+ 15V),

Table 2.31 defines the definition of + 15V interface

Table 2.31

pin	signal	defi niti on	expl ain
1	V1	Power supply input is positive at 15V	+ 15 External power input, external power output The current is greater than 2A
2	COM	Power reference	Power to
3	V2	Power supply input is negative for 15V	-15 External power supply input, external power supply output The current is greater than 2A

The DC24V interface is the interface that provides power to the control system inside the control box, and the voltage is DC24V (DC24V)

Table 2.32 defines the wiring of the POWER power cord



Figure 2.32 shows the schematic diagram of the POWER 2 power supply line



Table 2.32 shows the definition of the + 24V interface power line

Table 2.32

pin	signal	definition	explain
1	24V	power input	+ 24V external power supply input, the output power requirements of the power supply: above 200W, that is, the output current is greater than 8A (wire supply for mechanical and electrical demand)
2	COM	Power reference	Power to

2.4 HMI interface HMI interface

The HMI interface is a DB9 black plug through which the motherboard supplies and communicates to the HMI,



Figure 2.4 HMI, schematic diagram

Table 2.4 defines the HMI interface

Table 2.4

pin	signal	definition	explain
1	24V	Power supply output, 500 mA	HMI of power supply positive electrode

2	GND	Power supply output ground	HMI power supply negative electrode
3	T XD	The sender of the HMI	Serial port communication with the TXD signal
4	RXD	The receiving end of the HMI	Serial port communication with the RXD signal

2.5, the laser decoding interface



LASER RS232 The interface is the board card and the laser communication port.

pin	signal	definition	explain
1	DB 9 (public)	Laser and board card communication interface	TBD

2.6 Double pendulum industrial welding head interface

The motherboard provides a vibrating scope interface, compatible with the common digital lens interface on the market,

Table 2.6 shows the definition of the vibration scope interface.

Table 2.6

pin	signal	definition	explain
1	DB15	Vibrator scope & OLED interface	Control line for communication with industrial welding heads

2.7 Emergency stop trigger line

The control box provides a special security trigger signal line interface, which can provide a security guarantee for the operation. Table 2.7 defines for the safety clip interface.

Table 2.7

pin	signal	definition	explain
1	CF	trigger signal	Light out on trigger (alarm signal)

			green light)
2	SOS	Urgent stop signal	Access the robot emergency stop signal, and stop the light when pressed
3	CON	Robot signal ground	The robot

2.8 Introduction of the fan interface

The control box provides a dedicated 24V fan port interface position, independent socket, not easy to insert wrong.



Figure 2.8 Schematic diagram of the fan interface

2.9 Control interface of the wire feeder

The control box provides a special communication interface for the control wire feeder, and the 24V power supply is directly connected to the power input end of the control box and can be provided

3A Current, Table 2.9 defines the control interface of the wire feeder.

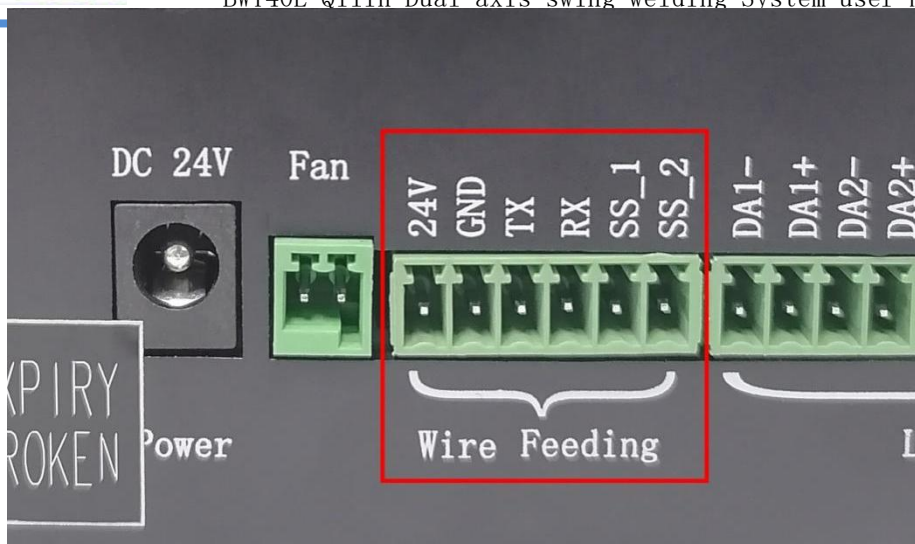


Figure 2.9 Schematic diagram of the control interface of the wire feeder

Table 2.9

pin	signal	definition	explain
1	24V	Power supply output end of wire feeder	Wfeeder 24V + power interface
2	GND	GND	GND
3	TX	Silk feeder and board card communication port	The wire transmitter communicates with the control system on TX signals
4	RX	Silk feeder and board card communication port	The wire feeder communicates the RX signals with the control system
5	SS_1	Wfeeder trigger signal 1	When short circuit SS_1 and SS_2
6	SS_2	Wfeeder trigger signal 2	When short circuit SS_1 and SS_2

2.10 Laser control interface

The laser interface is an 8 PIN, green terminal + 4 PIN green terminal

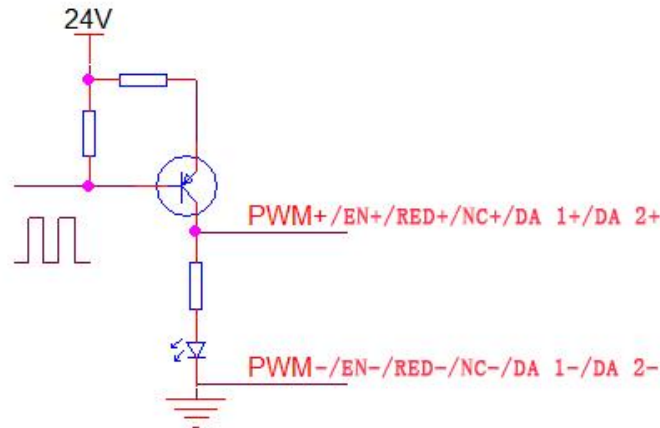


Figure 2.10 Diagram of the laser control interface

Table 2.10 shows the laser interface definition.

Table 2.10

pin	signal	definition	explain
1	PWM+	Laser-modulation signal +	Duty cycle 1% -100% adjustable, 24V and 5V switchable
2	PWM-	Laser Modulated signal-	Reference to the power source
3	EN+	Laser enabling signal +	Control laser light signal, high level effective, 24V and 5V can be switched
4	EN-	Laser-enabling signal-	Reference to the power source
5	RED+	Laser red light signal	Laser red light control (optional)
6	RED-	GND	Reference to the power source
7	NC+	The laser enables the backup port	Laser 24V backup port
8	NC-	Laser backup port ground	Reference to the power source
9	DA 1+	Analog voltage output +	For laser peak power regulation, 0-10V and 0-4V analog voltage selection

10	DA 1-	Analog voltage output-	Reference to the power source
11	DA 2+	Analog voltage output	For proportional valve adjustment, 0-10V analog voltage,
12	DA 2-	GND	Reference to the power source

2.11 Gas control and air pressure detection interface

The control box provides a dedicated IO interface, all output IO are using OC output can directly drive the relay, the maximum current can reach 500 mA, the wiring diagram is shown below.



Figure 2.111 Schematic diagram of the gas control interface

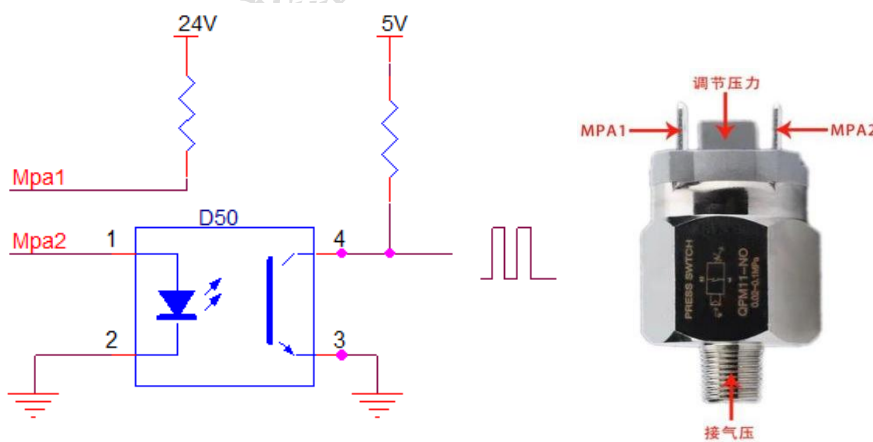


Fig. 2.112 Diagram of pressure detection interface

Table 2.11 defines the gas control interface

Table 2.11

pin	signal	defi	expl
-----	--------	------	------

		definition	explain
1	CAS 1+	Used to protect the gas blowing control positive electrode	Positive electrode of air valve, connecting card GAS 1 +
2	CAS 1-	Used to protect the gas to blow the gas to control the negative electrode	Negative de, adapcard GAS 1-
3	Mpa1	Air pressure detection and alarm: 1	Positive pressure, plate card Mpa 1
4	Mpa2	Air pressure detection and alarm: 2	Barometric negative electrode. Connect card Mpa 1

2.12 Alarm signal interface

Laser1 And 2 are the laser alarm signal interface, not on the green light, on the red light.

Water1 And 2 are the alarm signal interface of chiller, red light.

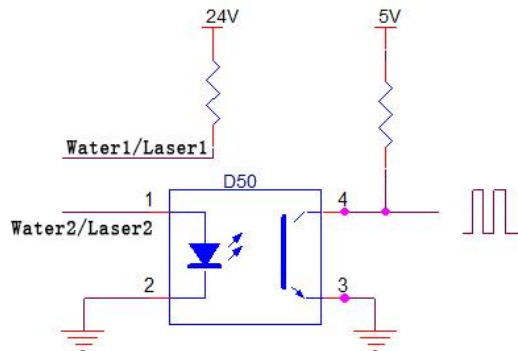


Fig. 2.12, Schematic diagram of the alarm signal interface

Table 2.12 shows the definition of the alarm signal interface.

Table 2.12

pin	signal	definition	explain
1	Laser_1	Laser device alarm signal	Short contact during the laser

			alarm
2	Laser_2	GND	Laser alarm signal ground
3	Water_1	Chiller machine alarm signal	When the chiller alarms, open and break
4	Water_2	GND	Cold water machine alarm

2.13 Robot control signal interface

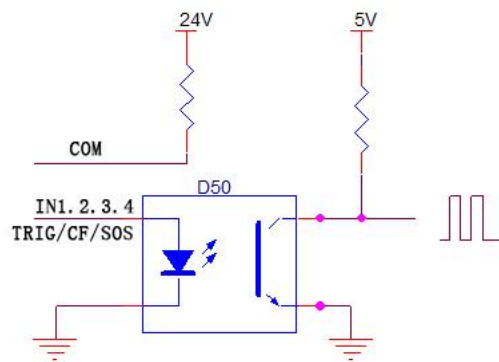


Figure 2.13 Schematic diagram of the robot control signal interface type

pin	signal	definition	explain
1	IN1	Standby port	Use only when the robot communicates with the PC
2	IN2	Standby port	Use only when the robot communicates with the PC
3	IN3	Standby port	Use only when the robot communicates with the PC
4	IN4	Standby port	Use only when the robot communicates with the PC
5	TRIG	Standby port	Use only when the robot communicates with the PC
6	CF	Light signal	When CF and COM short circuit, light out (if other conditions are reached)
7	SOS	Urgent stop signal	Emergency stop signal input can be set to NC and NO
8	VCC	Shared end	common port.

2.14 PNP & NPN conversion board

Each robot output interface on the market is different, usually divided into solid state relay, PNP and NPN output. This conversion board input terminal robot (ROBOOT) (applicable to PNP and NPN), and output terminal control box (CONTROL BOX). The wiring diagram is as follows:

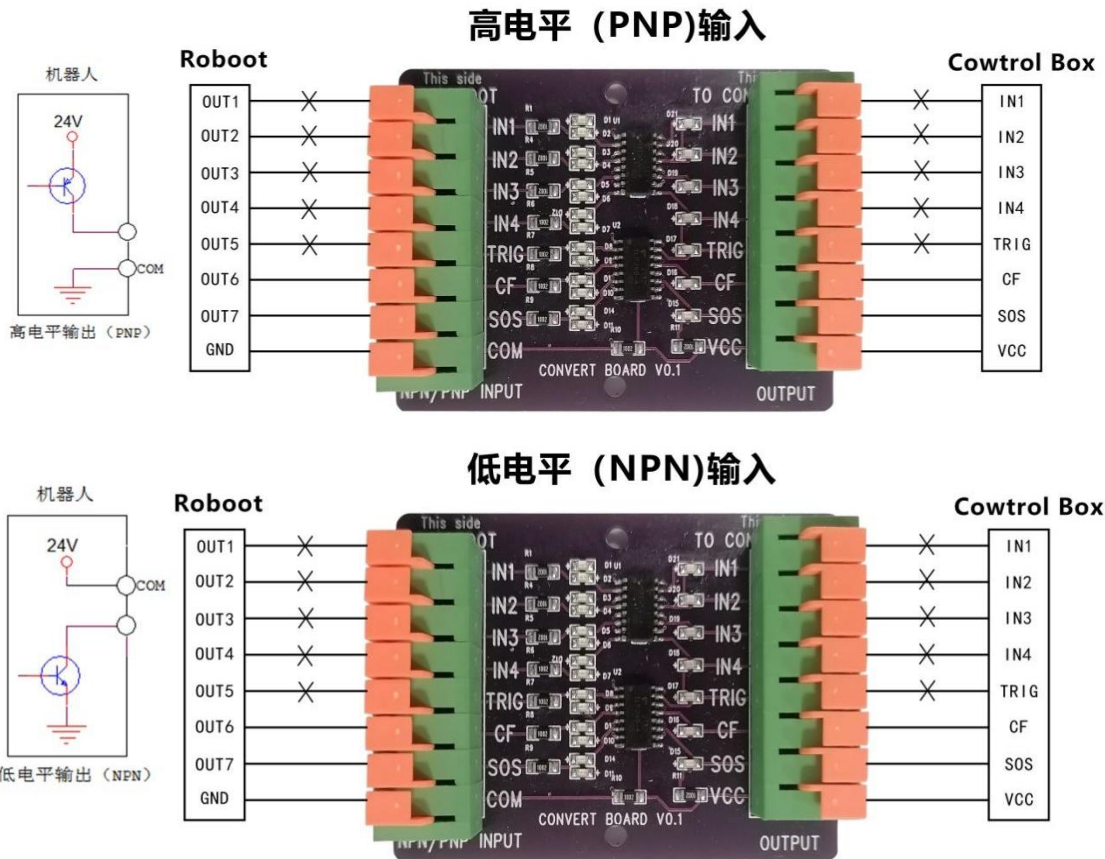


Figure 2.14 Schematic of PNP & NPN conversion board

2.15 Alarm lamp interface

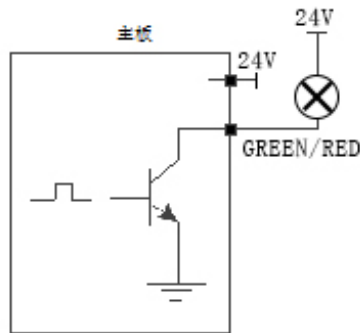


Fig. 2.15 Schematic diagram of the alarm lamp interface

When the RED has voltage, the alarm light is red.

When the alarm is removed, the GREEN has a voltage, and the alarm light is green.

Table 2.15 is the definition of the alarm signal light.

pin	signal	definition	explain
1	24V	Power supply output end of the alarm signal lamp	Connect to the power supply terminal of the alarm signal lamp
2	GREEN	Alarm signal light-green light	Connect the alarm signal light
3	RED	Alarm signal light-red light	Connect the alarm signal light red

2.16, the dial-code switch

order number	characteristic	definition	explain
1	IPG	Laser control signal	PWM, EN, RED, NC output 5V Power adjustment: 0-4V analog voltage adjustable section
2	NO IPG	Laser control signal	PWM, EN, RED, NC output of 24V Power adjustment: analog voltage adjustable section 0-10V

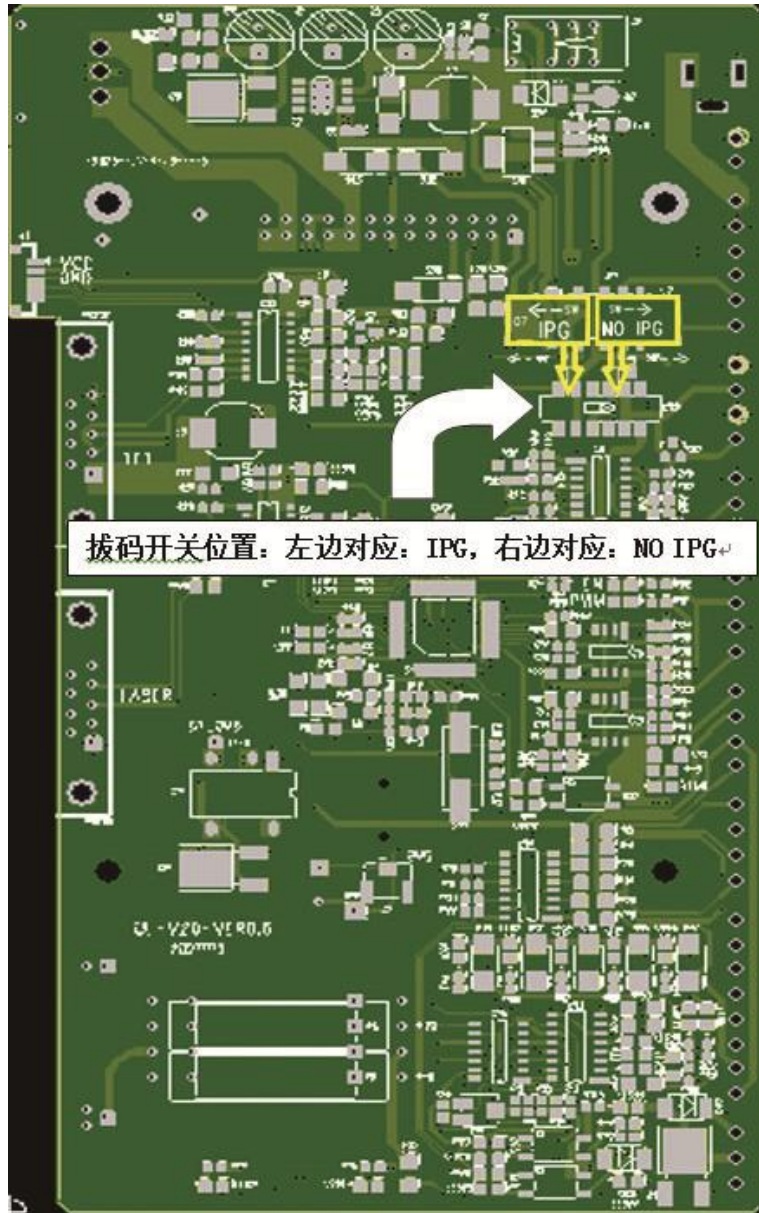


Figure 2.16, schematic diagram of dial switch

Chapter 3 Human-machine

interface HMI introduction

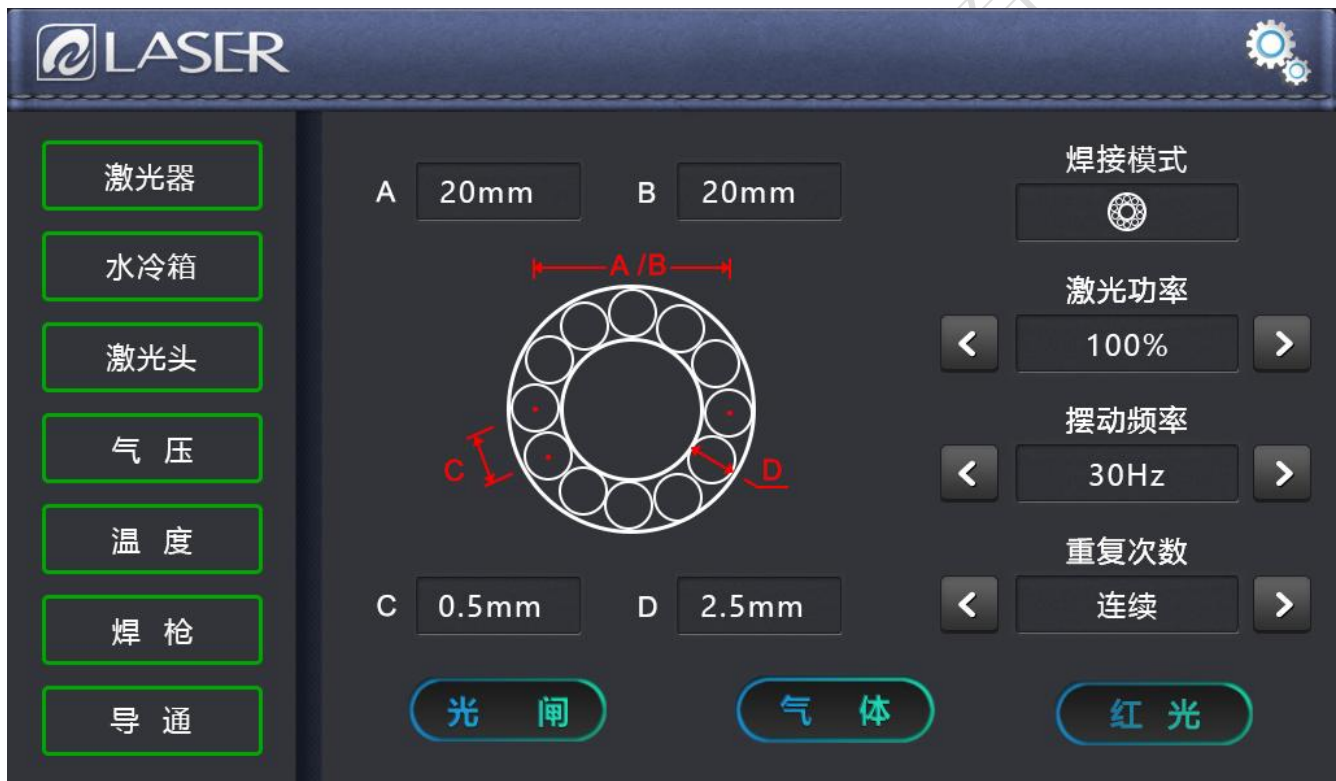
The main contents of this section are:

- Human-machine interface function and operation introduction

3.1 Human-machine interface function and operation introduction

Introduction of the main interface function and operation

The operating panel of Qilin double pendulum laser welding system adopts 7-inch configuration capacitive touch screen, which is dignified, generous and easy to operate. The relevant parameters of laser and laser swing head can be set respectively, and the light mode can also be controlled to realize multi-functional welding.



3.1 Schematic diagram of the main interface 1

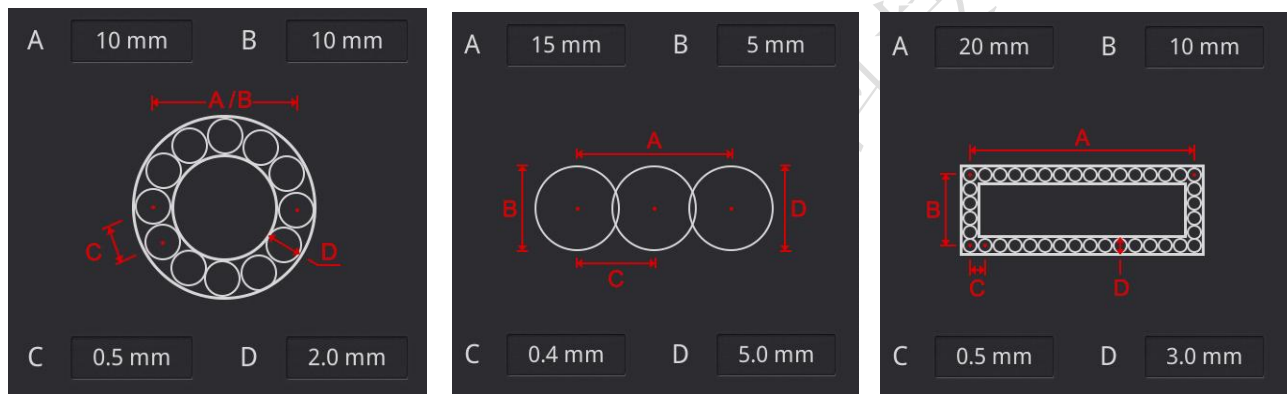
Light lock: the light switch is open to the normal light.

Gas: When the gas opens, the gas valve port will output 24V voltage, no need to open the gas, welding will automatically blow gas.

Red light: open the red light preview to preview the welding position in advance, to achieve the effect of adjusting the position in advance before welding.

Alarm signal light: provide real-time monitoring and reminder, monitor and alarm the temperature of laser head, air pressure, welding torch, conduction and handle. The full alarm state is displayed synchronously on the main screen and alarm light to remind users and quickly check problems.

Welding mode: ring, rectangle, filling welding mode.



AB: Diameter of the center of the circular ring mode A: diameter of the center of the filled mode A: diameter of the center of the rectangular mode
 C: Space between the outer ring circle BD: diameter of the outer ring circle B: diameter of the central point of the outer ring in the rectangular mode
 D: Diameter of the outer ring circle C: spacing between the outer ring circle C: spacing between the outer ring circle and the circle
 D: Diameter of the outer ring circle

Laser power: Set the peak power of the laser at welding.

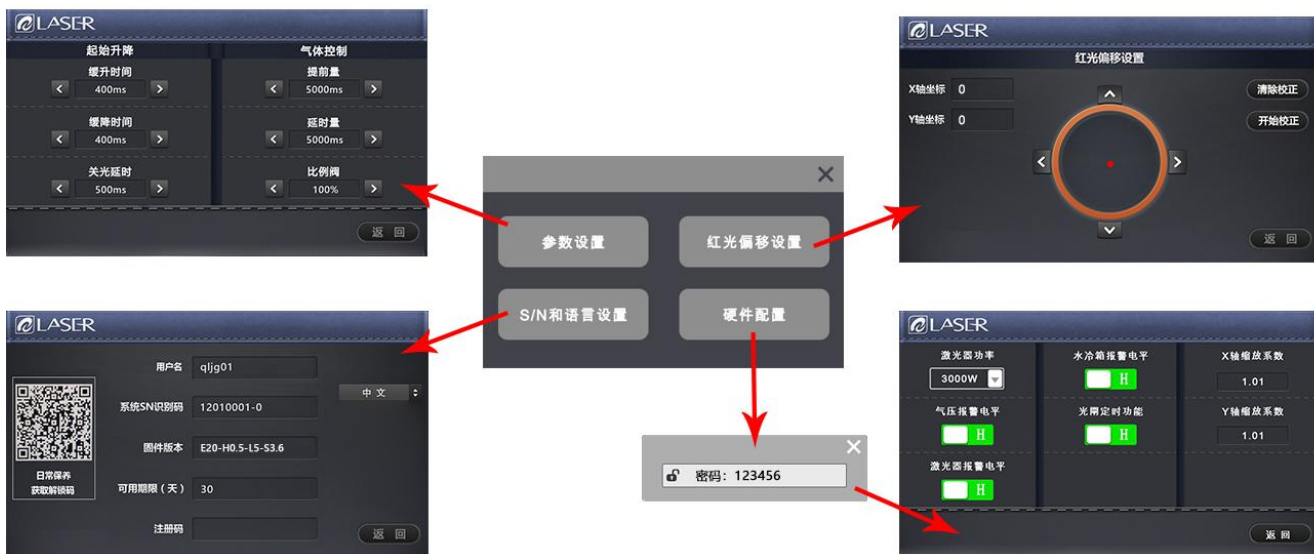
Swing frequency: the outer ring swing speed, the faster the swing frequency, the

faster the running speed.

Repeats: Set times, continuous welding, and 1-9 welding times



Press the "" on the main interface to enter the setting interface, as shown in the figure below



parameter setting:

Start lift:

Slow rise time: the laser power slowly reaches the peak power after the set slow rise time.

Slow descent time: After the laser power is turned off, the laser energy is slowly turned off.

Light off delay: When the laser is closed for 100ms, there is a full power input of 100ms to optimize the wire breaking function.

gas control:

Advance quantity: when starting processing, it can be set.

When the external start button is pressed, the air blow delays for a period of time, and then the laser starts.

Delency: When stopping processing, the delay gas can be set. When the processing is stopped, the laser output is stopped first,

After a time delay, then stop blowing.

Proportional valve: if the equipment has a proportional valve, it can control the size of the gas.

Red light offset setting:

Red light offset setting: when the red light is not in the central position of the nozzle, it can be adjusted by setting the red light offset in the X and Y coordinates.

Start correction: save the set offset parameters to the system and zero the display coordinates.

Clear correction: Clear the set offset parameters and reset the display coordinates.

SN and language settings:

System SN identification code: Product Serial number.

Firmware version: is the version currently used by the system.

Available period (days): usable period, all functions are invalid after expiration. (Automatic reminder within 7 days)

Registration code: used for decryption. After receiving the registration code, enter and click confirm to decrypt.

Language: English, Russian, Korean, Vietnamese, Japanese, Chinese

hardware configuration:

Password: 123456.

Laser power: The laser power used can be selected to retrieve the process package of this laser.

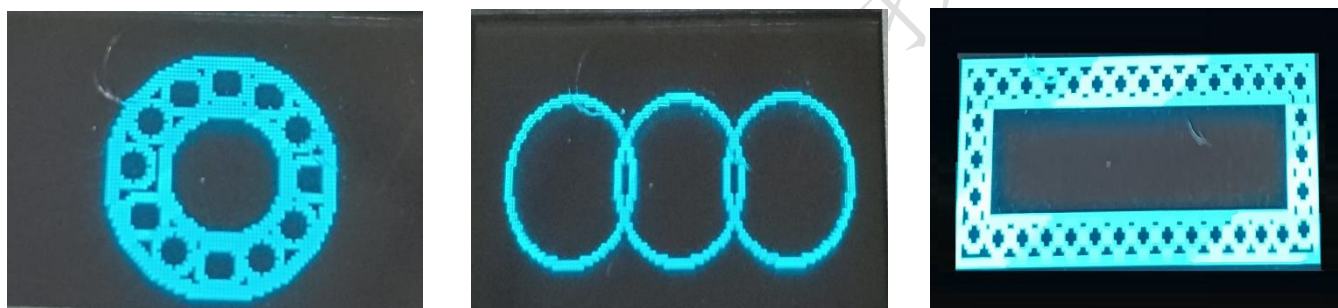
Alarm point level conversion: can choose high and low level to remove the laser, chiller and air pressure alarm.

Optical lock timing function: After opening this function, the optical lock will automatically close for 15 minutes without operation. Closing this function requires you to manually close the optical lock.

X-axis zoom coefficient: the knob can set the motor swing X-axis zoom coefficient, adjust the size of the figure, the range is 0.5-1.5 times adjustable;

Y-axis zoom coefficient: the knob can set the motor swing X-axis zoom coefficient, adjust the size of the figure, the range of 0.5-1.5 times adjustable;

3.2.2 Introduction of OLED display interface



Ring mode, fill mode, rectangular mode

Ring mode: Round spots are welded in a ring shape.

Fill mode: Fill welding with circular spot.

Rectangular mode: Round spots are welded in a rectangular shape.

Process Package of Reference Parameters:

1500W laser control					
order number	Material and thickness	Welding mode	laser power	hunting frequency	nu
1	Stainless Steel 1.0	Ring, fill, and rectangle	35%	16hz	
	Stainless Steel 1.5	Ring, fill, and rectangle	50%	14hz	
	Stainless Steel 2.0	Ring, fill, and rectangle	67%	10hz	
	Stainless Steel 2.5	Ring, fill, and rectangle	75%	8hz	
	Stainless Steel 3.0	Ring, fill, and rectangle	85%	6hz	
	Stainless Steel 3.5	Ring, fill, and rectangle	95%	6hz	
2	Carbon steel 1.0	Ring, fill, and rectangle	35%	16hz	
	Carbon steel 1.5	Ring, fill, and rectangle	50%	14hz	
	Carbon steel 2.0	Ring, fill, and rectangle	67%	10hz	
	Carbon steel 2.5	Ring, fill, and rectangle	75%	8hz	
	Carbon steel 3.0	Ring, fill, and rectangle	85%	6hz	
	Carbon steel 3.5	Ring, fill, and rectangle	95%	6hz	
3	Galvanized plate 1.0	Ring, fill, and rectangle	35%	16hz	
	Galvanized plate 1.5	Ring, fill, and rectangle	50%	14hz	
	Galvanized plate 2.0	Ring, fill, and rectangle	67%	10hz	
	Galvanized plate 2.5	Ring, fill, and rectangle	75%	8hz	
	Galvanized plate 3.0	Ring, fill, and rectangle	85%	6hz	
	Galvanized plate 3.5	Ring, fill, and rectangle	95%	6hz	
4	Aluminum plate 1.0	Ring, fill, and rectangle	40%	16hz	
	Aluminum plate 1.5	Ring, fill, and rectangle	55%	14hz	
	Aluminum board 2.0	Ring, fill, and rectangle	72%	10hz	
	Aluminum board 2.5	Ring, fill, and rectangle	80%	8hz	
	Aluminum board 3.0	Ring, fill, and rectangle	90%	6hz	
	Aluminum board 3.5	Ring, fill, and rectangle	98%	6hz	

The above parameters are provided for your reference

Description: For different lasers, other parameters in the process package parameters remain unchanged, only the power modification, can be set according to this formula:

When selecting 1000W laser: $P(1000W \text{ laser}) = P(1500W \text{ laser}) * (1000 / 1500)$

When selecting 2000W laser: $P(2000W \text{ laser}) = P(1500W \text{ laser}) * (2000 / 1500)$

When selecting 4000W laser: $P(4000W \text{ laser}) = P(1500W \text{ laser}) * (4000 / 1500)$

Use the laser welding system precautions

1. The biaxial swing welding head includes multiple control modules of laser, water cooler, laser welding system and laser welding head. In order to avoid interference, the argon arc welding machine and related equipment with large interference can ensure that the safe distance is kept at more than 5 meters. Ensure that the laser welding machine has independent space when conditions permit.
2. In order to reduce equipment leakage or static electricity, ensure the use of double pendulum industrial welding head equipment with effective earth wire.
3. Please repeatedly confirm whether the cable joint is connected and locked normally. After locking, it can be wrapped with insulation tape.
4. Check whether the laser head and the optical fiber are locked and connected. After confirming that it is normal, the beautiful strip tape can be sealed and wound to ensure that the dust does not enter the laser head cavity.
5. Check whether there is water seepage in the cavity. There are many waterways in the cavity. Do not loosen the screws without professional training to prevent water droplets from entering the cavity.
6. Check whether the protective lens drawer is normal, ensure that the sealing ring is normal and effective, when replacing the protective lens, ensure that the alcohol wipes the external stains of the laser head, at least 5 times, and ensure that the lens environment is clean and clean before the lens is replaced.
7. The laser head is so complex. To avoid short circuit, stay away from the water source and make sure that no liquid can be sprayed on the laser head.

8. Laser head refuses to use strong wind to blow and clean the laser head, and can only be wiped with alcohol and dust-free cloth.
9. The laser head is installed with a digital motor. When used, it must be put gently to prevent motor failure.
10. When the laser head is not used, please use the system gas blowing air for many times to discharge the dust, and remove the copper nozzle, use the sealing tape to seal, and use the copper nozzle to blow the air for more than 2 times before using it.
11. Continuous interruption of power supply will cause damage to the welding control system, if the external wire transmitter, 24V power supply, please provide 200W (power voltage 24V, output current equal to or greater than 8A) above the reliable power supply!
12. The external safety lock is 24V high level, do not short connect with the aviation plug GND shell of the system cable, or do not pay attention to collide with each other when installation, otherwise the short circuit may burn the power supply or the main control board.

Quality assurance description:

The warranty period of this product is 12 months, starting from the date of factory. If the product is faulty during the warranty period, it can be sent back

Our company, free maintenance, free of labor costs. All lens categories (e. g. collimated lens, focusing lens, mirror, cover

Protection lens, motor lens, etc.), appearance parts (cavity and handle, etc.) and consumables (copper nozzle, stainless steel pipe, and other easy to lose

Product) is not in the warranty scope.

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If you have any comments or suggestions on the product and instructions during use, please call for consultation. Tel.:

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Thank you for using the products of Shenzhen Qilin Laser
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